Fisher® 1061 Pneumatic Piston Rotary Actuator with Style F & G Mounting Adaptations

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Figure 1. Fisher 1061 Actuator with V500 Valve and DVC6200 FIELDVUE™ Digital Valve Controller

Introduction

Scope of Manual

This instruction manual includes installation, adjustment, maintenance, and parts ordering information for the Fisher 1061 pneumatic piston rotary actuator with F and G mounting adaptations (see figure 1). Instructions for the control valve, the auxiliary declutchable handwheel actuator, the valve positioner, and accessories are covered in separate instruction manuals.

Do not install, operate, or maintain a 1061 actuator without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

Table 1. Specifications

Available Configuration

Double-acting pneumatic piston rotary actuator for
■ throttling service when used with positioner, or
■ on-off service when used with switching devices

Actuator Sizes

■ 30, ■ 40, ■ 60, ■ 68, ■ 80, ■ 100, ■ and ■ 130,

Cylinder Operating Pressure

Minimum Recommended:

■ 1.4 bar (20 psig) without positioner or
■ 0.3 bar (5 psig) above actuator requirement with positioner

Maximum Allowable(1):

Size 30 and 60: 6.9 bar (100 psig)
Size 40: 10.3 bar (150 psig)
Size 68: 5.9 bar (85 psig)
Size 80: 10.3 bar (150 psig)
Size 100: 10.3 bar (150 psig)
Size 130: 10.3 bar (150 psig)

Valve Shaft Diameters, mm (Inches)

Size 30: ■ 12.7 (1/2), ■ 15.9 (5/8), ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), and ■ 31.8 (1-1/4)

Size 40, 60, and 68: ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), ■ 31.8 (1-1/4), ■ 38.1 (1/2), ■ 44.5 (1-3/4), and ■ 50.8 (2)

Size 80 and 100: ■ 44.5 (1-3/4), ■ 50.8 (2), and ■ 63.5 (2-1/2)

Size 130: ■ 76.2 (3), ■ 88.9 (3-1/2)

Maximum Valve Shaft Rotation

■ 90 degrees or ■ 60 degrees (travel stop required for 60 degree rotation limit)

Material Temperature Capabilities with Standard Elastomers(1)

-34 to 82°C (-30 to 180°F)

Pressure Connections

1/4 NPT internal
3/4 NPT internal for Pipe-Away Vent option
1 NPT internal for size 130

Travel Indication

Graduated scale and pointer located on actuator cover at actuator end of valve shaft

Mounting Positions

See figure 2

Approximate Weights

Size 30: 22 kg (49 lb)
Size 40: 29 kg (63 lb)
Size 60: 39 kg (86 lb)
Size 68: 56 kg (123 lb)
Size 80: 122 kg (246 lb)
Size 100: 135 kg (298 lb)
Size 130: 299 kg (660 lb)

1. The pressure/temperature limits in this manual and any applicable standard or code limitation for valves should not be exceeded.

Description

The 1061 actuator is a double-acting pneumatic piston rotary actuator for use with rotary-shaft valves having splined valve shafts. The 1061 actuator can be used for either throttling or on-off applications.

The style G mounting bracket is for Fisher 9500 valves only. The style F mounting bracket is for all other rotary valves.

Specifications

Specifications are shown in table 1 for 1061 actuators. Specifications are stamped on the nameplate. Refer to the actuator nameplate for the construction setting and serial number for the actuator when it originally came from the factory.

Educational Services

For information on available courses for 1061 Style F and G actuators, as well as a variety of other products, contact:

Emerson Process Management
Educational Services, Registration
P.O. Box 190; 301 S. 1st Ave.
Marshalltown, IA 50158-2823
Phone: 800-338-8158 or
Phone: 641-754-3771
FAX: 641-754-3431
e-mail: education@emerson.com

Principle of Operation

Piston movement is accomplished by loading air pressure on one side of the piston, and unloading air pressure from the other side of the piston. If no positioner is used with the control valve, a loading device, such as a 4-way switching valve, must be provided. Such a device is not furnished with the actuator.

Refer to the separate valve positioner instruction manual for the 1061 actuator principle of operation with positioner.

Installation

When an actuator and valve are shipped together, the actuator is normally mounted on the valve. Follow the valve instructions when installing the control valve in the pipeline. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the procedures presented in the Actuator Mounting section.

⚠ WARNING

To avoid personal injury, always wear protective gloves, clothing, and eyewear when performing any installation operations.

To avoid personal injury or property damage caused by bursting of pressure retaining parts, be certain the service conditions do not exceed the limits given in table 1 or on the nameplate. Use pressure limiting or pressure relieving devices to prevent the cylinder pressure from exceeding the maximum allowable cylinder operating pressure.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

Actuator Mounting

Use the following steps to connect a valve and actuator that have been ordered separately, or if the valve or actuator were separated for maintenance purposes.

Key numbers used in this procedure are shown in figures 8, 9 and 11.

⚠ WARNING

Perform the steps in the WARNING at the beginning of the Maintenance section.

1. Refer to instructions in the appropriate valve instruction manual.
2. If a valve positioner is installed on the actuator, remove the positioner.

On the travel indicator side of the actuator:

3. Remove the cap screws and washers (keys 35 and 76), and remove the actuator cover (key 34). If an optional manual handwheel actuator is being used, it will be removed with the cover.
4. If the lever (key 28) is attached to the rod end bearing (key 12), remove the cap screw and hex nut:

- **For size 30, 40, 60, and 68 actuators,** remove the cap screw and hex nut (keys 13 and 14).
- **For size 80 and 100 actuators,** remove the cap screw, washer, and hex nut (keys 13, 84, and 85).
- **For size 130 actuators,** remove the cap screw and locknut (keys 13 and 85).

On the valve side of the actuator:

5. The actuator is normally positioned vertically with the valve in a horizontal pipeline. Refer to figure 2 for available mounting styles and positions that match your application. Also, refer to the lever/shaft orientation provided in the valve instruction manual.

CAUTION

It is important, when installing the actuator on the valve, to be sure that the valve is positioned correctly.

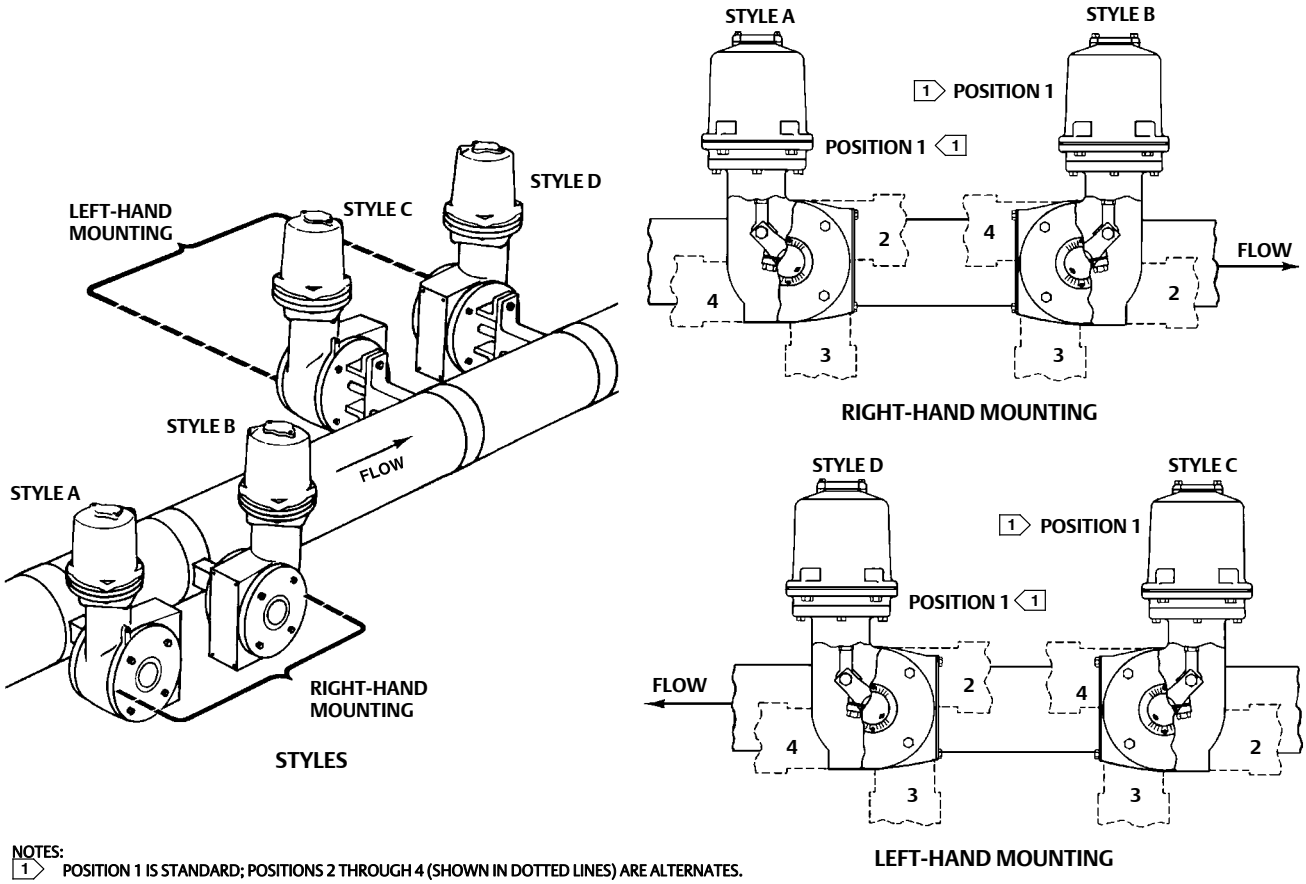
- **Note the actuator style, position, and lever in relationship to the valve body and drive shaft end marks (see step 13, below).**
- **The valve internal components can be damaged if forced past its fully open or fully closed position.**

6. Screw the mounting yoke (key 23) onto the actuator, and tighten the screws (key 24). Slide the actuator onto the valve shaft, and secure the mounting yoke to the valve body with the valve mounting screws.
7. Tighten the valve mounting cap screws to the bolting torque values given in table 2.
8. Hold the valve in the correct position, and secure it with the cap screws (key 24).

MOUNTING	ACTION(1)	VALVE SERIES OR DESIGN				VALVE SERIES OR DESIGN		
		BALL/PLUG ROTATION TO CLOSE	V250	V150, V200 & V300	CV500 V500	DISC/BALL ROTATION TO CLOSE	V250	8510B, 8532, 8560 & 9500
Right-Hand	PDTC PDTO	CCW CCW	A B	A B	A B	CW CW	NA NA	B A
Left-Hand	PDTC PDTO	CCW CCW	NA NA	D C	D C	CW CW	C D	C D
Left-Hand (Optional)(2)	PDTC PDTO	CW CW	NA NA	C D	NA NA	NA NA	NA NA	NA NA

1. PDTC—Push-down-to-close, and PDTO—Push-down-to-open.
2. A left hand ball will be required for the NPS 3 through 12 Series B and the NPS 14 to 20, with or without attenuator.

Figure 2. Mounting Styles and Positions



NOTES:
1 POSITION 1 IS STANDARD; POSITIONS 2 THROUGH 4 (SHOWN IN DOTTED LINES) ARE ALTERNATES.
2. BY EMERSON PROCESS MANAGEMENT DEFINITION:
- FORWARD FLOW IS INTO THE FACE SIDE OF DISC , OR BALL SEALING SURFACE.
- REVERSE FLOW IS INTO THE HUB SIDE OF THE DISC OR BALL.

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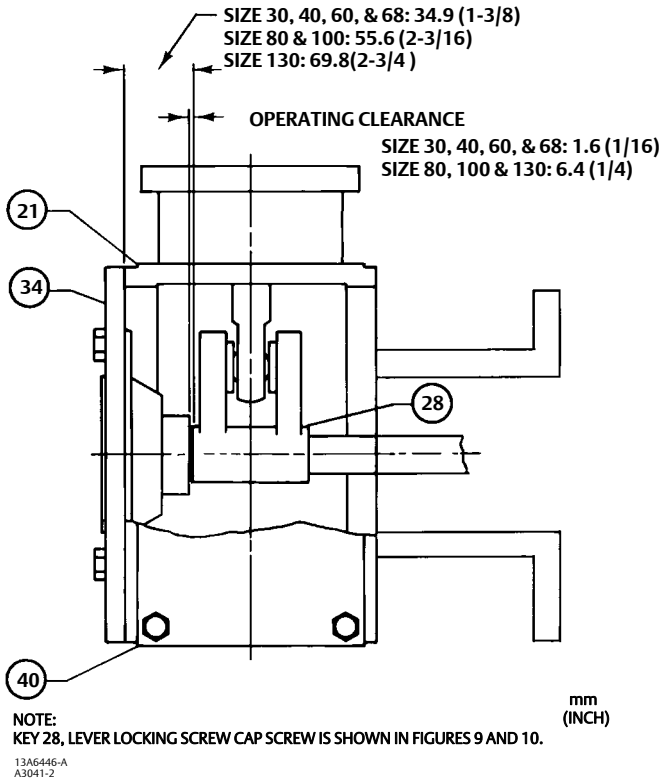
Table 2. Bolting Torque Values for Valve Mounting Cap Screws

VALVE SHAFT DIAMETER		VALVE MOUNTING CAP SCREWS	
mm	Inch	N•m	lbf-ft
12.7 to 25.4	1/2 to 1	80	65
31.8 & 38.1	1-1/4 & 1-1/2	135	100
44.5 & 50.8	1-3/4 & 2	183	135
63.5	2-1/2	390	290
76.2 & 88.9	3 & 3-1/2	745	550

On the travel indicator side of the actuator:

9. Screw the left-hand threaded hex nut (key 71) onto the piston rod (key 10) as far as possible.
10. Screw the turnbuckle (key 70) onto the piston rod as far as possible. Only finger-tighten it, as this adjustment will be changed in a later step.
11. Screw the hex nut (key 11) onto the rod end bearing. Then thread this assembly completely into the turnbuckle.

Figure 3. Lever Operating Clearance



12. To aid installation of the lever, apply lithium grease lubricant (key 93) to the valve shaft spline.

For size 80, 100 and 130 actuators, it may be necessary to rotate the set screw (key 82) clockwise slightly to spread the split portion of the lever and allow installation on the valve shaft.

13. Refer to the appropriate valve instruction manual for lever/shaft orientation marks, and slide the lever into place. Refer to figure 3 for the appropriate lever operating clearance.

- **For size 80, 100 and 130 actuators,** when the lever is in place, back off the set screw (key 82) so the lever can be clamped onto the valve shaft.

- **For all sizes:** Hold the lever in position, and secure the assembly with the cap screw (key 29).

14. Rotate the lever until the cap screw hole is aligned with the rod end bearing (key 12). You may need to adjust the turnbuckle to make this alignment.
15. For all actuator sizes, apply thread locking sealant (high strength) (key 83) to the cap screw (key 13) threads.

Table 3. Recommended Bolting Torques

KEY NUMBER	ACTUATOR SIZE				
	30	40 & 60	68	80 & 100	130
	N•m				
3	102	102	102	102	123
6	14	14	14	---	91
9	61	136	248	---	1763
11	34	102	102	475	542
13	80	271	271	271	1763
22	23	68	68	169	162
24	34	81	81	271	257
29	81	271	271	271	970
35	34	81	81	271	257
41	14	14	14	14	14
71	102	163	253	475	542
86	---	---	---	861	---
KEY NUMBER	**lbf•ft**				
3	75	75	75	75	75
6	10	10	10	---	67
9	45	100	257	---	1300
11	25	75	75	350	400
13	60	200	200	200	1300
22	17	50	50	125	120
24	25	60	60	200	190
29	60	200	200	200	715
35	25	60	60	200	190
41	10	10	10	10	10
71	75	120	260	350	400
86	---	---	---	635	---

⚠ WARNING

Refer to table 3 for bolt torque requirements. Exceeding any torque requirements could damage actuator parts and impair safe operation. Refer to the Warning at the beginning of the Installation section in this manual.

Note

If the cap screw key number is shown in table 3, torque the cap screws to the value shown in the table for final assembly.

16. Connect the lever to the rod end bearing with the cap screw and hex nut (keys 13 and 14) for size 30, 40, 60, and 68 actuators; with the cap screw, washer, and locknut (keys 13, 84, and 85) for size 80 and 100 actuators; or with the cap screw and hex nut (keys 13 and 85) for size 130. Torque cap screw and hex nut to the value listed in table 3.
17. Note the valve disc or ball position and direction of rotation.

⚠ WARNING

To avoid possible personal injury, do not stroke the actuator while the cover (key 34) is off.

a. **If no handwheel actuator is to be used,** position the travel indicator (key 38) according to the valve disc or ball position just noted. Replace the cover (key 34), and secure it with the washers and cap screws (keys 76 and 35). If the holes in the cover and housing (key 21) do not align, temporarily loosen the cap screws (key 24) and shift the housing slightly. Do not stroke the actuator while the cover is off.

b. **If a manual handwheel actuator is to be used,** refer to the separate instruction manual for mounting instructions.

18. If the 1061 actuator is equipped with an auxiliary handwheel actuator, make certain that a cylinder bypass valve (key 68, figure 10) is also used to equalize cylinder pressure during handwheel operation. Operating the handwheel actuator by itself against the force of differential cylinder pressures is difficult or even impossible. Install a bypass valve as shown in figure 10. If the actuator was equipped with a valve positioner, refer to the positioner instruction manual mounting procedures.

Changing Actuator Mounting

The actuator is normally positioned vertically in a horizontal pipeline. However, four mounting styles and four positions are possible for each style. See figure 2.

Be sure to refer to the appropriate valve instruction manual for lever/valve shaft orientation, when changing styles and/or positions. Most mounting changes will require the actuator lever to change position in relationship to the valve splined shaft. It is possible to damage the valve if the actuator drives the valve disc or ball past its fully open or fully closed position.

Refer to the Actuator Mounting section, to disassemble and assemble the actuator when changing the style or position of the actuator.

CAUTION

Do not use a hammer or similar tool to drive the lever (key 28) off the valve shaft. Driving the lever could damage internal valve parts. On some valves, driving the lever off the shaft could move the valve disc or ball and bearings away from the centered position, causing subsequent damage to valve parts as the valve is operated.

If necessary, use a wheel puller to remove the lever from the valve shaft. It is permissible to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could damage valve parts or disrupt the centered position of the valve disc or ball and bearings.

When changing styles and/or positions, most mounting changes will require the actuator lever to change position in relationship to the valve splined shaft. It is possible to damage the valve if the actuator drives the valve disc or ball past its fully open or fully closed position.

Key numbers referenced in the following procedures are shown in figures 8, 9 and 11.

Changing Styles

Style A is right-hand mounted while Style D is left-hand mounted. In all other ways, styles A and D are identical.

Style B is right-hand mounted while Style C is left-hand mounted. In all other ways, styles B and C are identical.

The actuator housing, for style A & D is turned 180 degrees to convert it to a style B & C, or vice versa. In other words, the actuator cover (key 34) is removed and placed on the mounting yoke (key 23) side.

The mounting yoke is placed on the cover side of the actuator housing (key 21). The lever (key 28) must be removed and replaced during the procedure. Refer to figure 3 and note the relationship of the valve style and the pipeline.

Table 4. Open-End Wrench Size Required for Turnbuckle Adjustments, Inches

ACTUATOR SIZE	TURNBUCKLE (KEY 70)	LOWER LOCKNUT (KEY 11)	UPPER LOCKNUT (KEY 71)
30	1-1/8	3/4	1-1/8
40 & 60	1-5/16	1-1/8	1-5/16
68	1-7/8	1-1/8	(1)
80 & 100	1-7/8	1-7/8	1-7/8
130	2-3/4	2-3/4	2-3/4

1. A 3/8-inch diameter rod is used for tightening.

Changing Positions

The actuator housing (key 21) position, and its orientation with the mounting yoke (key 23) can be changed into four different positions. Refer to figure 3 and note the possible positions for each style.

Pressure Connections

1. Connect either NPS 1/4 pipe or 3/8-inch tubing between the actuator pressure connections and the instrument. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the control signal.
2. When the control valve is completely installed and connected to the instrument, check for correct action (air-to-open or air-to-close) to match the controlling instrument. For successful operation, the actuator stem and valve shaft must move freely in response to the loading pressure change on the piston.

Adjustment

The only adjustment on the 1061 actuator is to make sure that the valve disc or ball is correctly closed when the actuator piston is against the travel stop. For accurate adjustment to the zero-degree valve disc or ball position, you must remove the control valve from the pipeline. Refer to the valve instruction manual for instructions during this procedure.

If the actuator is equipped with a manual handwheel actuator, make sure that the manual actuator is disengaged from the valve shaft and that the bypass valve (key 68, figure 10) is closed before you perform adjustment procedures.

Perform the following steps to adjust the actuator turnbuckle. A regulated air supply will be required to stroke the actuator during this procedure. Also, when you perform this adjustment, refer to table 4 for the sizes of open-end wrenches required to loosen and tighten the hex nuts and turnbuckle.

Key numbers referenced in this procedure are shown in figures 8, 9, and 11.

⚠ WARNING

Perform the steps in the WARNING at the beginning of the Maintenance section.

1. Refer to instructions in the appropriate valve instruction manual.

2. Remove the access plate (key 72). Also remove the machine screws (key 73) if present.

Note

The cover (key 34) supports the outer end of the valve shaft and should not be removed during actuator adjustment.

3. Stroke the actuator until you can reach the lower hex nut (key 11) through the access opening. Loosen the hex nut.
4. Stroke the actuator until you can reach the left-hand threaded upper hex nut (key 71) through the access opening. Loosen the hex nut.
5. Perform one of the following:

   a. Push-down-to-close (extending piston rod closes the valve): Slowly stroke the actuator to the down travel stop. Refer to the appropriate valve instruction manual to determine the closed position of the valve. Adjust the turnbuckle (key 70) until the valve is in the closed position. Lock this adjustment with the left-hand threaded hex nut (key 71). Stroke the actuator to the up travel stop, and tighten the lower hex nut (key 11). Check thread engagement distance. The thread engagement should be the distance of the diameter of the thread. Tighten the lower hex nut (key 11) using the torque values shown in table 3.

   b. Push-down-to-open (extending piston rod opens the valve): Stroke the actuator to the up travel stop. Refer to the appropriate valve instruction manual to determine the closed position of the valve. Check the valve position. Stroke the actuator until you reach the turnbuckle (key 70) through the access opening. Adjust the linkage. Stroke the actuator to the up travel stop again, and check the new adjustment. Continue this procedure until the valve is in the closed position when the actuator piston is resting against the up travel stop. Check thread engagement distance. The thread engagement should be the distance of the diameter of the thread. Tighten the lower hex nut (key 11) using the torque values shown in table 3.

6. Replace the access plate (key 72).
7. Loosen the self-tapping screws (key 39), and adjust the travel indicator (key 38). Re-tighten the self-tapping screws.

CAUTION

If using a handwheel actuator, the valve shaft spline could be damaged if excessive torque is applied to the valve shaft by the manual actuator while the 1061 power actuator is stopped at either end of travel. To protect the valve shaft, perform the travel stop adjustment procedure found in the separate handwheel actuator instruction manual.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Instructions are given below for disassembly and replacement of parts.

⚠ WARNING

Avoid personal injury or property damage from sudden release of process pressure or uncontrolled movement of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**

- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Key numbers are shown in figures 8, 9 and 11.

Disassembly

The following procedure describes how to completely disassemble the actuator. When inspecting and replacing parts, perform only those steps necessary to accomplish the repair.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment. Refer to instructions in the appropriate valve instruction manual.
2. Remove the positioner, if one is used. If necessary, refer to the positioner instruction manual for removal instructions.
3. Unscrew the cap screws and washers (keys 35 and 76), and remove the cover (key 34). If an optional manual handwheel actuator is used, it will be removed with the cover. Refer to the separate handwheel actuator instruction manual for instructions.
4. Remove the retaining ring (key 31). If necessary, remove the travel indicator (key 38), by removing the screws (key 29) from the hub (key 30).
5. Inspect, and if necessary, replace the cover bushing (key 32). Remove the travel indicator scale (key 36) by removing the self-tapping screws (key 37). Press the bushing out of the cover (key 34).
6. Remove the cap screw and hex nut (keys 13 and 14) for size 30, 40, 60, and 68 actuators; the hex nut and washer (keys 85 and 84) for size 80 and 100 actuators; or the cap screw and heavy hex nut for size 130 (key 13 and 85).
7. Note the lever/valve shaft orientation. Loosen cap screw (key 29). For size 80, 100 and 130 actuators, rotate set screw (key 82) clockwise slightly to spread the split portion of the lever (key 28).

CAUTION

When removing the actuator from the valve, do not use a hammer or similar tool to drive the lever (key 28) off the valve shaft. Driving the lever could damage internal valve parts. On some valves, driving the lever off the shaft could move the valve disc or ball and bearings away from the centered position, causing subsequent damage to valve parts as the valve is operated.

If necessary, use a wheel puller to remove the lever from the valve shaft. It is permissible to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could damage valve parts or disrupt the centered position of the valve disc or ball and bearings.

8. For size 30, 40, and 68 actuators, unscrew cap screws (key 6) and remove cylinder cap (key 4). Inspect and, if necessary, replace the O-ring (key 5).
9. Remove rod end bearing (key 12) and hex nut (key 11), remove the turnbuckle (key 70) and hex nut (key 71).
10. Remove cap screws (key 3) and slide the cylinder assembly (key 1) from the cylinder flange (key 2).
11. Pull the piston (key 7) and piston rod (key 10) from the cylinder assembly.
12. Inspect and, if necessary, replace the O-rings (keys 8 and 16).
13. To separate the piston (key 7) from the piston rod (key 10), unscrew the cap screw or hex nut and washer (keys 9 and 77) for size 30, 40, 60 and 68 actuators or the hex nut (key 86) for size 80 and 100 actuators.
14. For the size 130 actuator, a piston rod disassembly fixture (figure 4) is recommended to properly disassemble the piston from the piston rod. Consult your Emerson Process Management sales office if this assembly must be disassembled.
15. Unscrew the cap screws (key 22) and remove the cylinder flange (key 2), sliding seal (key 19), and seal support cylinder (key 20).
16. Inspect, and if necessary, replace the O-rings (keys 17 and 18) and thrust washer (key 74).
17. Unscrew the cap screws (key 24) from the mounting yoke, and remove the actuator housing assembly (key 21).
18. Unscrew the mounting yoke (key 23) from the valve by removing the valve mounting cap screws. Slide the yoke off the valve shaft.
19. Inspect, and if necessary replace the mounting yoke bushing (key 81). It may be necessary to press out the bushing.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start these instructions at the appropriate step. This procedure also assumes that the valve is removed from the pipeline for ease in actuator assembly and adjustment.

Key numbers used in the following procedures are shown in figures 8, 9, and 11.

Note

Many of the replacement mounting yokes (key 23) are available only as assemblies that also include the bushing (key 81). However, replacement bushings are also available separately (see the Parts List).

1. If the bushing (key 81) was removed, press in the new bushing. The end of the bushing should be flush with the bottom of the recess in the mounting yoke (key 23).
2. Slide the mounting yoke over the valve shaft, and secure it to the valve with the valve mounting cap screws.
3. Tighten the valve mounting cap screws to the bolting torque values given in table 2.

⚠ WARNING

Refer to table 3 for bolt torque requirements. Exceeding any torque requirements could damage actuator parts and prevent safe operation. Refer to the Warning at the beginning of the Installation section in this manual.

Note

The cap screws torque values shown in table 3 are for final assembly.

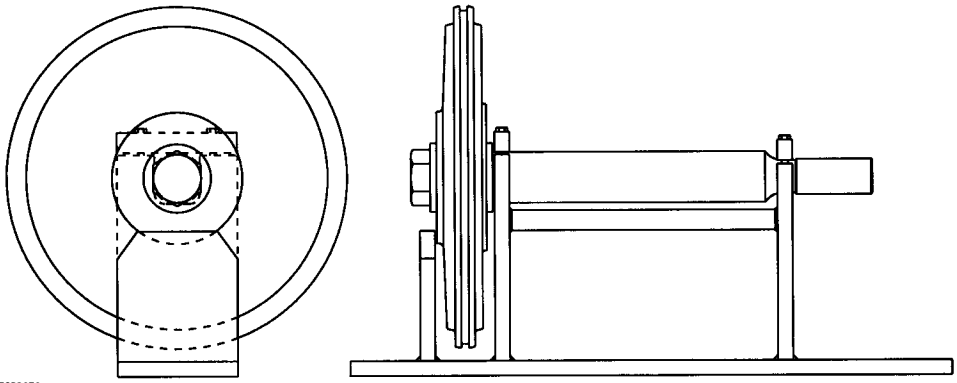
4. Refer to figure 2 for the desired orientation of the housing (key 21). Secure the housing to the mounting yoke with the cap screws (key 24).
5. Apply lithium grease lubricant (key 93) to the surfaces of the sliding seal (key 19). Refer to torque values shown in table 3. Be sure the O-rings (keys 17 and 18) are inserted correctly.

Note

When assembling parts, make sure that all O-rings are positioned correctly as shown in figures 8, 9, and 11.

6. Install the seal support cylinder (key 20), the thrust washer (key 74), the sliding seal, and the cylinder flange (key 2) and secure these parts with the cap screws (key 22).
7. **If 60-degree rotation is specified,** a travel stop (key 15) will be threaded into the cylinder flange on size 30 to 100. For size 130, a travel stop and travel stop sleeve (keys 15 and 6) will be put into the cylinder flange.
8. Apply lithium grease lubricant (key 93) to the valve shaft. Refer to the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 28) into place. See figure 3 for correct lever operating clearance.

Figure 4. Piston Rod Assembly Fixture for Size 130 Actuator



For Size 80, 100 and 130 actuators, rotate the set screw (key 82) clockwise slightly to spread the split portion of the lever and allow easy installation onto the shaft. After the lever is properly positioned, back-off the set screw so that the lever can be clamped to the shaft.

9. Hold the lever in place (see figure 3), and clamp the lever to the valve shaft with the cap screw (key 29).
10. Apply lithium grease lubricant (key 93) to the sealing surface of the piston rod (key 10) and apply anti-seize sealant (key 91) to the tapered end of the piston rod on all sizes except 130.
11. Attach the piston (key 7) to the piston rod, applying thread locking adhesive (medium strength) (key 92) to the threads (key 9 or 10):

    a. *For Size 30, 40, 60 and 68 actuators:* Secure it with the cap screw and washer (keys 9 and 77).

    b. *For Size 80 and 100 actuators:* Secure it with the hex nut (key 86).

    c. *For the Size 130 actuator* a piston rod assembly fixture (figure 4) is recommended to properly assemble the piston to the piston rod because of the high torque required and the need to properly protect the sealing surface of the piston rod. Consult your Emerson Process Management sales office for additional information to properly assemble these parts.

d. Tighten the screw or nut to the torque specified in table 3.

12. Insert the piston and piston rod assembly down through the sliding seal (key 19). Attach the hex nut (key 71), turnbuckle (key 70), hex nut (key 11), and rod end bearing (key 12) to the piston rod assembly.
13. Rotate the lever to align with the rod end bearing. This connection can be aided by carefully moving the piston/rod assembly up or down.
14. Apply thread locking adhesive (medium strength) (key 92) or equivalent thread-locking compound to the threads of the cap screw (key 13).
15. **Connecting the lever to the rod:**

- *For Size 30, 40, 60, and 68 actuators:* Connect the lever and the rod end bearing with the cap screw and hex nut (keys 13 and 14).
- *For Size 80, 100, and 130 actuators:* Connect the lever and the rod end bearing with the cap screw, washer, and hex nut (keys 13, 84, and 85). Size 130 does not require the washer (key 84).

16. Install the O-ring (key 8 or 16) on the piston edge. Apply lithium grease lubricant (key 93) to the inside wall of the cylinder. Install the cylinder (key 1).
17. Attach the cylinder assembly (key 1) to the cylinder flange with the cap screws (key 3).

Size 130 has a mark on the cylinder flange that must align with a mark near the top of the housing flange.

18. *For Size 30, 40, and 68 actuators,* Place the O-ring (key 5) in the cylinder cap, replace the cylinder cap (key 4), and secure it to the cylinder assembly with the cap screws (key 6). Tighten all cap screws to the torques specified in table 3.
19. Install the hub (key 30) plus bushing (key 32) into the cover (key 34), and secure with the retaining ring (key 31).
20. Replace the travel indicator scale (key 36), and secure it with the self-tapping screws (key 37). Install the travel indicator (key 38), and secure it with the self-tapping screws (key 39).
21. Note the valve disc or ball position and direction of rotation.

⚠ WARNING

To avoid possible personal injury, do not stroke the actuator while the cover (key 34) is off.

a. **If no handwheel actuator is to be used,** position the travel indicator (key 38) according to the valve disc or ball position just noted. Replace the cover (key 34) and secure it with the cap screws and washers (key 35 and 76). If the holes in the cover and housing do not align, temporarily loosen the cap screws (key 24) and shift the housing slightly. Do not stroke the actuator while the cover is off.

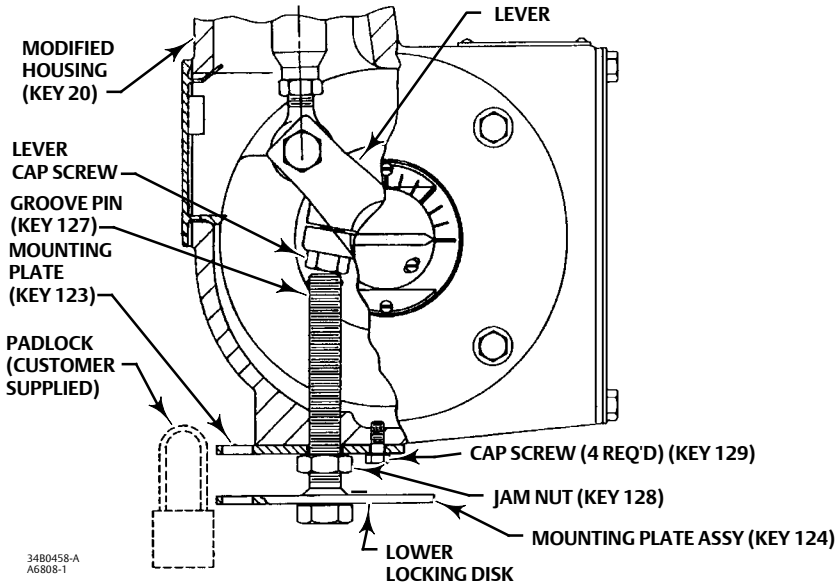
b. **If the actuator is equipped with a manual handwheel actuator,** refer to the separate instruction manual for mounting procedures.

22. If a positioner is to be used, refer to the separate valve positioner instruction manual for proper installation.
23. Follow the instructions in the Adjustment section for correct actuator turnbuckle adjustment.

Locking Mechanism

To add the locking mechanism to an existing actuator, purchase the retrofit kit to install this modification or order individual parts from your Emerson Process Management sales office. Replacement parts are shown in the Parts List section.

Figure 5. Locking Mechanism (Size 30, 40, 60, and 68)



Installing the Locking Mechanism

Refer to figures 5 and 6 for locking mechanism details and key number locations.

⚠ WARNING

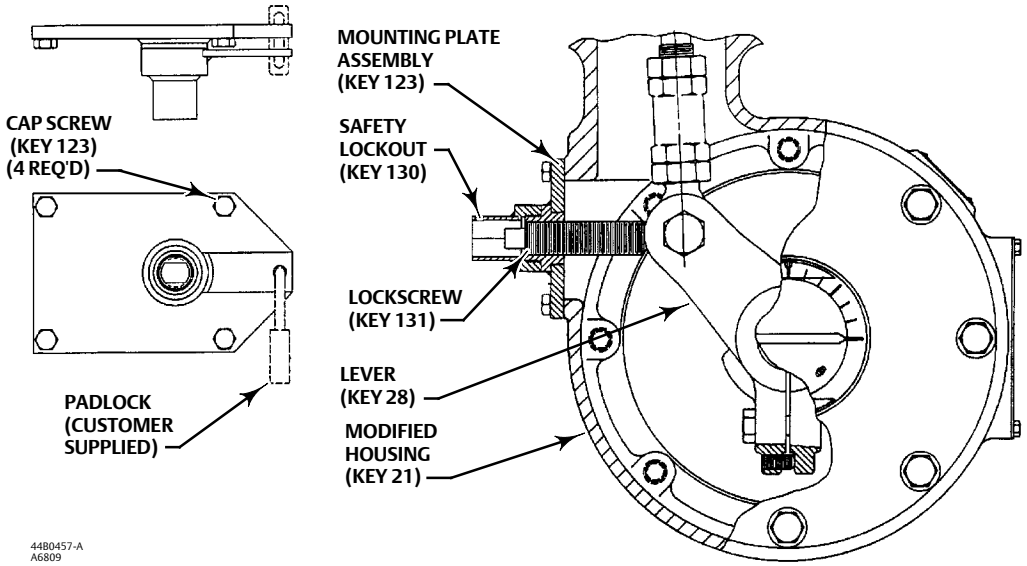
Perform the steps in the WARNING at the beginning of the Maintenance section.

1. Refer to instructions in the appropriate valve instruction manual.
2. Disassemble the actuator by following the procedures in the Disassembly section.

For Size 30, 40, 60, & 68 Actuators

1. Attach the mounting plate (key 123) to the modified housing (key 21) as shown in figure 5. Attach it with the cap screw (key 129). Be sure the hole in the center of the mounting plate lines up with the large tapped hole in the housing.
2. Be sure the jam nut (key 128) is threaded onto the threaded bolt on the mounting plate assembly (key 124) before threading it into the housing.
3. After the bolt is threaded into the housing, install the groove pin (key 127) into the end of the bolt. (The groove pin will prevent the threaded bolt from being totally unthreaded from the actuator housing.)

Figure 6. Locking Mechanism (Size 80 and 100)



4. Make sure that the bolt is not threaded in so far that it will interfere with re-assembly of the actuator.
5. Be sure the actuator piston rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
6. Screw the threaded bolt into the housing until it contacts the actuator lever cap screw.
7. Insert the padlock (not furnished) to connect the mounting plate (key 123) with the lower locking disk on the mounting plate assembly (key 124). You might have to back off the lower locking disk a slight amount to line up the holes for the padlock.
8. Tighten the jam nut (key 128) against the mounting plate.
9. Refer to the Operating the Locking Mechanism section.

For Size 80 & 100 Actuators

1. Attach the mounting plate (key 123) to the modified housing (key 21) as shown in figure 6. Attach it with the four cap screws (key 129).
2. Thread the lockscrew (key 131) into the mounting bracket.
3. Make sure that the lockscrew is not threaded in so far that it will interfere with re-assembly of the actuator.
4. Be sure the actuator piston rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
5. Screw the lockscrew into the housing until it contacts the actuator lever (key 28).
6. Screw the safety lockout (key 130) onto the mounting plate (key 123) until finger-tight. Then back it off until the hole in the arm of the safety lockout aligns with the hole in the mounting plate for the padlock.
7. Insert the padlock (not furnished) to connect the mounting plate (key 123) with the arm of the safety lockout (key 130). If the shackle of the padlock does not seem long enough, do not attempt to modify the actuator. The larger 1061 sizes may require a padlock with a longer shackle.
8. Refer to the Operating the Locking Mechanism section.

Operating the Locking Mechanism

Key numbers are located in figures 5 and 6.

To Unlock the Actuator (Size 30, 40, 60, & 68)

1. Remove the padlock. Loosen the jam nut (key 128, figure 5), and unscrew the threaded bolt until it is stopped by the groove pin (key 127) in the threaded bolt.

Note

For normal operation of the actuator, the threaded bolt must be unscrewed far enough so that the actuator lever will not contact the bolt in normal actuator operation.

2. If you are going to leave the bolt threaded into the housing, lock it with the jam nut (key 128) so that it cannot be screwed into the housing and interfere with normal actuator operation.

To Unlock the Actuator (Size 80 & 100)

1. Remove the padlock. Remove the safety lockout (key 130, figure 6) and unscrew the lockscrew until it is free of the lever path.

Note

For normal operation of the actuator, the threaded bolt must be unscrewed far enough so that the actuator lever will not contact the bolt in normal actuator operation. A good rule of thumb is to unscrew the lockscrew until it is approximately even with the outward edge of the safety lockout when installed.

2. If you are going to leave the bolt threaded into the housing, reinstall the safety lockout and padlock.

To Lock the Actuator (Size 30, 40, 60, & 68)

1. Be sure the actuator piston rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
2. Be sure the jam nut (key 128, figure 5) is loose. Then, screw the threaded bolt into the housing until it contacts the head on the cap screw of the actuator lever.
3. Rotate the threaded bolt until one of the holes in the lower locking disk (which is welded to the bolt) is in line with the hole in the mounting plate (key 123). Tighten the jam nut against the mounting plate.
4. Lock the plate and disk together with a padlock (not furnished).

To Lock the Actuator (Size 80 & 100)

1. Be sure the actuator piston rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
2. Screw the lockscrew (key 131) into the housing until it contacts the actuator lever (key 28, figure 9).
3. Screw the safety lockout (key 130) onto the mounting plate (key 123) until finger-tight. Then back it off until the hole in the arm of the safety lockout aligns with the hole in the mounting plate for the padlock.
4. Insert and lock the padlock (not furnished) to connect the mounting plate (key 123) with the arm of the safety lockout (key 130). The larger 1061 sizes may require a padlock with a longer shackle.

Pipe-Away Vent

Some applications require venting of gas from the rotary actuator housing. The 3610 Series positioners vent into the actuator housing, and from there, the gas has numerous avenues of escape.

⚠ WARNING

If a flammable, hazardous, or reactive gas is used as the supply pressure medium, personal injury or property damage could result from fire or explosion of accumulated gas or from contact with hazardous or reactive gas.

The positioner on the control valve assembly does not form a gas-tight seal. If the assembly is in an enclosed area, use a remote vent line, and use other safety measures to adequately ventilate the assembly. A remote vent pipe alone cannot be relied upon to remove all hazardous gas.

Vent line piping should comply with local and regional codes. It should be as short as possible with adequate inside diameter and few bends to remove exhaust gases to a ventilated area.

Note

This modification is NOT intended to be a leak-proof or pressure-tight design. It is intended to aid in containing the gas that vents from the positioner and allow for connection of piping to carry it away.

The Parts List section, at the end of this manual, provides...

- Retrofit kit numbers to modify an actuator for the vent piping
- Replacement parts for pipe-away vents
- Retrofit kit numbers for modification of units in the field

Take care that adequate vent pipe size is used. This is particularly important with the larger size actuators with fast stroking speed requirements. In these situations, large quantities of gas can be vented very quickly through the positioner, and you must have adequate pipe-away capability. Keep the vent piping as short as possible with few bends.

Key numbers are shown in figure 7 unless otherwise noted. Refer to the actuator Disassembly and Assembly steps to gain access to the following parts.

For installation and maintenance of the pipe-away vent system, be sure to do the following:

⚠ WARNING

Perform the steps in the WARNING at the beginning of the Maintenance section.

Refer to instructions in the appropriate valve instruction manual.

Bushings—Remove the mounting yoke bushing (key 67), and the end plate cover bushing (key 31, figures 9 and 11), then replace them with the pipe-away vent parts. As shown in figure 7, the mounting yoke bushing (key 132) has two pieces with an O-ring (key 133) between them. The end plate cover repeats the assembly with a two-piece bushing (key 134) with an O-ring between them (key 135).

Travel Indicator—A gasket (key 136) is placed under the travel indicator plate. Remove the indicator plate (key 37, figures 8, 9 and 11), install the gasket (key 136) as shown in figure 7.

Housing Vent Plug—A vent is provided in the housing design. To plug this opening, the pipe-away vent kit provides a hex pipe plug (key 140) for this opening as shown in figure 7. Install the hex plug (key 140) into this opening and tighten it.

Parts Ordering

When corresponding with your Emerson Process Management sales office about this equipment, refer to the serial number found on the actuator nameplate. Also, specify the complete 11-character part number from the following parts list when ordering replacement parts.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Repair Kits

Actuator Repair Kits

Key	Description	Part Number
Actuator Repair Kits Include Keys 5, 8, 16, 17, 18, and 56.		
	Size 30	R1061X00302
	Size 40	R1061X00402
	Size 60	R1061X00602
	Size 68	R1061X00682
	Size 80	R1061X00802
	Size 100	R1061X01002

Parts List

Note
Part numbers are shown for recommended spares only. For part numbers not shown, contact your Emerson Process Management sales office.

Key	Description	Part Number
1	Cylinder Assembly	
2	Cylinder Flange	
3	Cap Screw	
4	Cylinder Cap	
5*(1)	O-Ring, nitrile	
	(for size 30, 40, & 68 only)	10A3800X012
	(for size 130 only)	1D348306992
6	Cap Screw	
7	Piston	
8*(1)	O-Ring, nitrile	
	Size 30	1H862106992
	Size 40	1H862206992
	Size 60	1H862406992
	Size 68 & 80	1H862506992
	Size 100	1H862606992
	Size 130	1J453806992
9	Cap Screw (for size 30, 40 & 60 only)	

Actuator Common Parts (figures 8, 9, & 11)

Pipe-Away Vent Retrofit Kit

Pipe-Away Vent Kit Includes: Access Plate assembly, Two-Piece Bushing, Two O-Rings, Gasket, and Sealant. See Figure 7.

Pipe-Away Vent Retrofit Kit Numbers

SHAFT DIAMETER		ACTUATOR SIZE	KIT PART NUMBER
mm	Inches		
12.7	1/2	30	34B4646X022
15.9	5/8	30	34B4646X032
19.1	3/4	30	34B4646X042
		40, 60, & 68	34B4646X052
22.2	7/8	30	34B4646X062
		40, 60 & 68	34B4646X072
25.4	1	30	34B4646X082
		40, 60, & 68	34B4646X092
31.8	1-1/4	30	34B4646X102
		40, 60 & 68	34B4646X112
38.1	1-1/2	40, 60 & 68	34B4646X122
44.5	1-3/4	40, 60, & 68	34B4646X132
50.8	2	40, 60 & 68	34B4646X142
50.8	2	80 & 100	34B4647X032
54.0	2-1/8	80 & 100	34B4647X042
63.5	2-1/2	80 & 100	34B4647X052
69.9 x 63.5 to 101.6 x 63.5	2-3/4 x 2-1/2 to 4 x 2-1/2	100	34B4647X052

Key	Description	Part Number
9	Hex Nut (for size 68 & 130 only)	
10	Piston Rod	
11	Hex Nut	
12	Rod End Bearing	
13	Cap Screw	
14	Hex Nut	
15	Travel Stop (not required for 90 degree rotation)	
16*(1)	O-Ring, nitrile	
	Size 30	1H862006992
	Size 40	1D444806992
	Size 60	1H862306992
	Size 68 & 80	1H862506992
	Size 100	1H862606992
	Size 130	1J453806992

*Recommended spare parts
1. Included in repair kit.

Key	Description	Part Number
17*(1)	O-Ring, nitrile	
	Size 30	1B8855X0042
	Size 40 & 60	1H8498X0022
	Size 68	1D3483X0012
	Size 80 & 100	1H862706992
	Size 130	1J453706992
18*(1)	O-Ring, nitrile	
	Size 30	12A9480X012
	Size 40 & 60	1V3234X0012
	Size 68	13A0824X012
	Size 80 & 100	1P233206992
	Size 130	1D546506992
19	Sliding Seal	
20	Seal Support Cylinder	
21	Housing	
22	Cap Screw	
23	Mounting Yoke	
24	Cap Screw	
28	Lever	
29	Cap Screw	
30	Hub	
31	Retaining Ring	
32*	Bushing, fiberglass	
	Size 30	12A9373X012
	Size 40, 60,& 68	12A9374X012
	Size 80 & 100	14A7815X012
	Size 130	18B3052X012
34	Cover	
35	Cap Screw	
36	Travel Indicator Scale	
37	Self Tapping Screw	
38	Travel Indicator	
39	Self-Tapping Screw	
39	Cap Screw	
40	Positioner plate	
41	Cap Screw	
42	Nameplate	
43	Drive Screw	
55	Vent Screen (Not shown)	
56*(1)	O-Ring, nitrile (for size 30, 40 & 68 only) (not shown)	1C853806992

Note

Key numbers 62 thru 68 and key 83 are used with bypass only (figure 10).

62	Connector	
63	Elbow	
64	Pipe Nipple	
65	Pipe Plug	
66	Pipe Cross	
67	Tubing	
68	Bypass Valve	
70	Turnbuckle	
71	Hex Nut	
72	Access Plate	
73	Machine Screw	
74	Thrust Washer	
76	Washer	
77	Washer	

Key	Description	Part Number
81*	Bushing (See following table)	
82	Set Screw	
83	Thread Locking Sealant (high strength)	
84	Washer	
85	Hex Nut	
86	Hex Nut	
87	Cap Screw	
90*	O Ring	1D348306992
91	Anti-Seize Sealant	
92	Thread Locking Adhesive (medium strength)	
93	Lithium Grease Lubricant	
122	Thrust Washer	

Locking Mechanism Parts (figure 5 or 6)

123	Mounting Plate	
124	Mounting Plate Assy	
127	Groove Pin	
128	Jam Nut	
129	Cap Screw	
130	Safety Lockout	
131	Lockscrew	

Pipe-Away Vent Parts (figure 7)

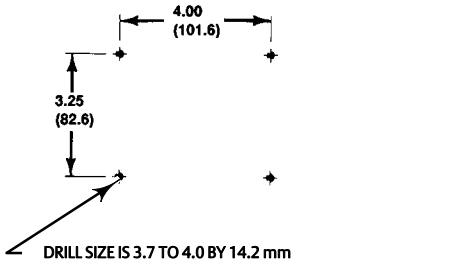
Note

Complete Retrofit Kits are Listed at the Beginning of the Parts List. Use This Listing for Individual Replacement Parts

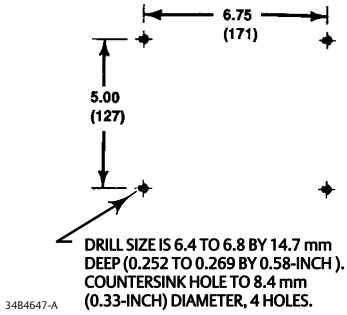
132*	Lined Bushing (Steel/PTFE) Yoke Side	
	12.7 mm (1/2-inch) Shaft Diameter (2 req'd)	1U902599402
	15.9 mm (5/8-inch) Shaft Diameter (2 req'd)	14B4642X012
	19.1 mm (3/4-inch) Shaft Diameter (2 req'd)	F1918348112
	22.2 mm (7/8-inch) Shaft Diameter (2 req'd)	14B4631X012
	25.4 mm (1-inch) Shaft Diameter (2 req'd)	14B4632X012
	31.8 mm (1-1/4-inch) Shaft Diameter (2 req'd)	14B4633X012
	38.1 mm (1-1/2-inch) Shaft Diameter (2 req'd)	14B4634X012
	44.5 mm (1-3/4-inch) Shaft Diameter (2 req'd)	14B4635X012
	50.8 mm (2-inch) Shaft Diameter (2 req'd)	G1668548112
133*	O-Ring (Nitrile)	
	12.7 mm (1/2-inch) Shaft Diameter	1J4888X0052
	15.9 mm (5/8-inch) Shaft Diameter	11A8741X052
	19.1 mm (3/4-inch) Shaft Diameter	1F4636X0032
	22.2 mm (7/8-inch) Shaft Diameter	10A3805X012
	25.4 mm (1-inch) Shaft Diameter	10A8217X042
	31.8 mm (1-1/4-inch) Shaft Diameter	1F1153X0012
	38.1 mm (1-1/2-inch) Shaft Diameter	1P1676X0012
	44.5 mm (1-3/4-inch) Shaft Diameter	1P1676X0012
	50.8 mm (2-inch) Shaft Diameter	10A3800X012
134*	Bushing (Steel/PTFE) Hub Side	
	Size 30/40	
	12.7 to 22.2 mm (1/2- to 7/8-inch) Shaft Diameter	14B3503X012
	Size 40	
	25.4 to 31.8 mm (1- to 1-1/4-inch) Shaft Diameter	14B3503X012
	Size 60	
	19.1 to 50.8 mm (3/4- to 2-inch) Shaft Diameter	14B4310X012

*Recommended spare parts
1. Included in repair kit.

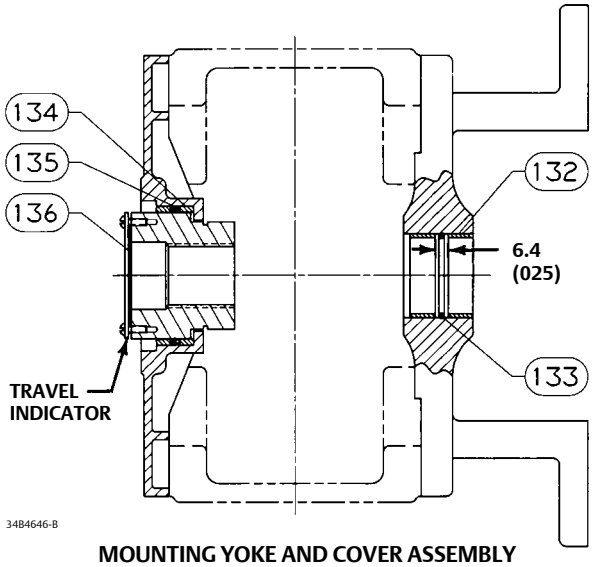
Figure 7. Pipe-Away Vent Assembly



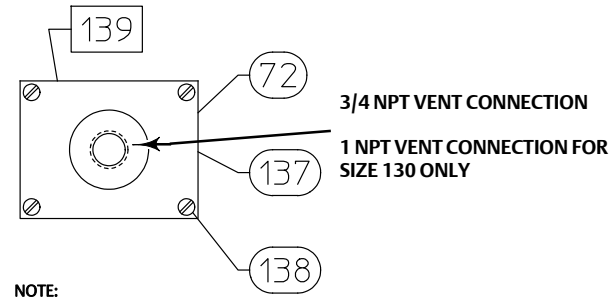
DRILLING AND TAPPING PATTERN
ACCESS PLATE ASSEMBLY
SIZE 30, 40, 60, & 68 ACTUATORS



DRILLING AND TAPPING PATTERN
ACCESS PLATE ASSEMBLY
SIZE 80 AND 100 ACTUATORS

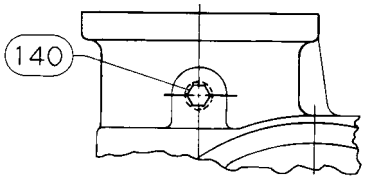


MOUNTING YOKE AND COVER ASSEMBLY



NOTE:
FOR FIELD CONVERSION, DRILL AND TAP HOLE PATTERN IF HOUSING HAS A NON-METALLIC ACCESS PLATE. USE KEY 137 AS A DRILLING TEMPLATE IF DESIRED OR, USE THE DIMENSIONS PROVIDED IN THIS FIGURE FOR DRILLING AND TAPPING.
□ APPLY SEALANT
34B4646-B

ACCESS PLATE ASSEMBLY



NOTE:
INSTALL THE HEX HEAD PLUG (KEY 140) INTO THE VENT OPENING LOCATED IN THE ACTUATOR HOUSING.
40B3945-B

HOUSING VENT PLUG LOCATION

mm
(INCH)

Key	Description	
135*	O-Ring (Nitrile) Hub Side	
	Size 30/40	
	12.7 to 22.2 mm (1/2- to 7/8-inch) Shaft Diameter	1K594906562
	Size 40	
	25.4 to 31.8 mm (1- to 1-1/4-inch) Shaft Diameter	1K594906562
	Size 60	
	19.1 to 50.8 mm (3/4- to 2-inch) Shaft Diameter	1U2504X0042

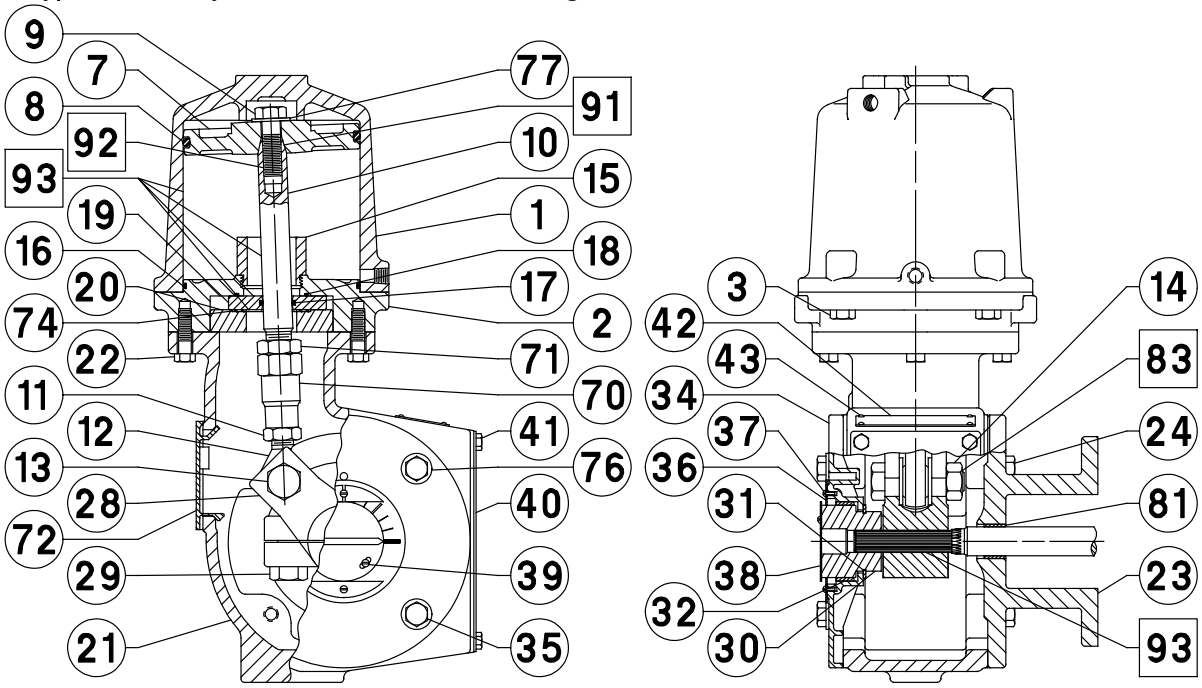
Key	Description
136	Travel Indicator Gasket
137	Access Plate Assembly
138	Machine Screw
139	RTV Blue or Equivalent Silicon Gasket, #6B
140	Plug

Piston/Piston Rod Torquing Fixture

Size 130 58B3070

*Recommended spare parts

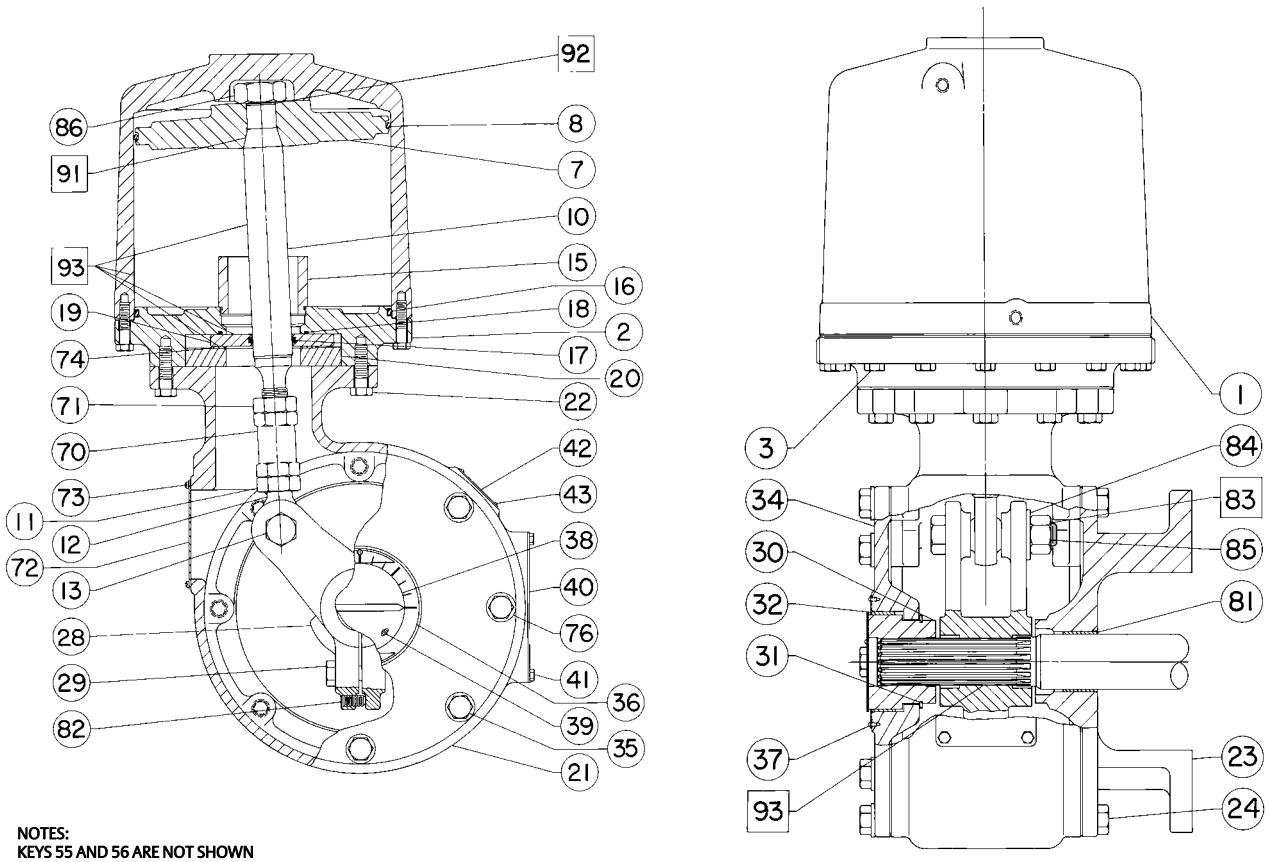
Figure 8. Typical Assembly for Fisher 1061 Sizes 30 through 68 Actuators



NOTES:
KEYS 56, 87, AND 141 ARE NOT SHOWN
□ APPLY LUBRICANT OR SEALANT

58A9228-C

Figure 9. Typical Assembly for Fisher 1061 Size 80 and 100 Actuators



NOTES:
KEYS 55 AND 56 ARE NOT SHOWN
□ APPLY LUBRICANT OR SEALANT

54A7844-J SHT 1 & 2

Figure 10. Partial View of Actuator with Bypass Valve

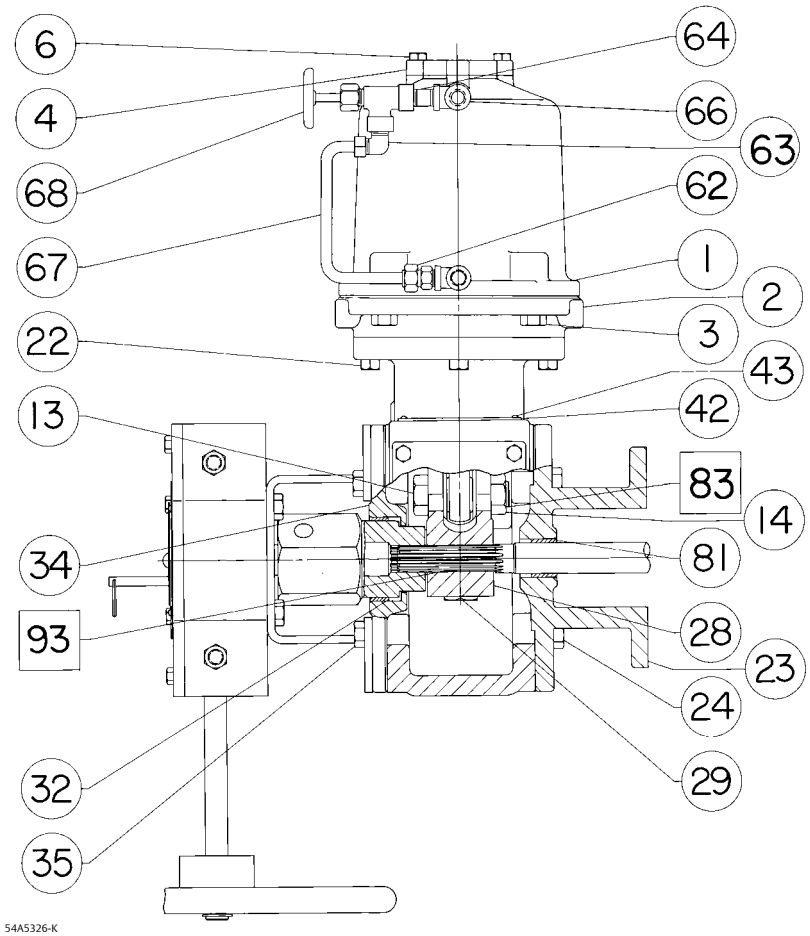
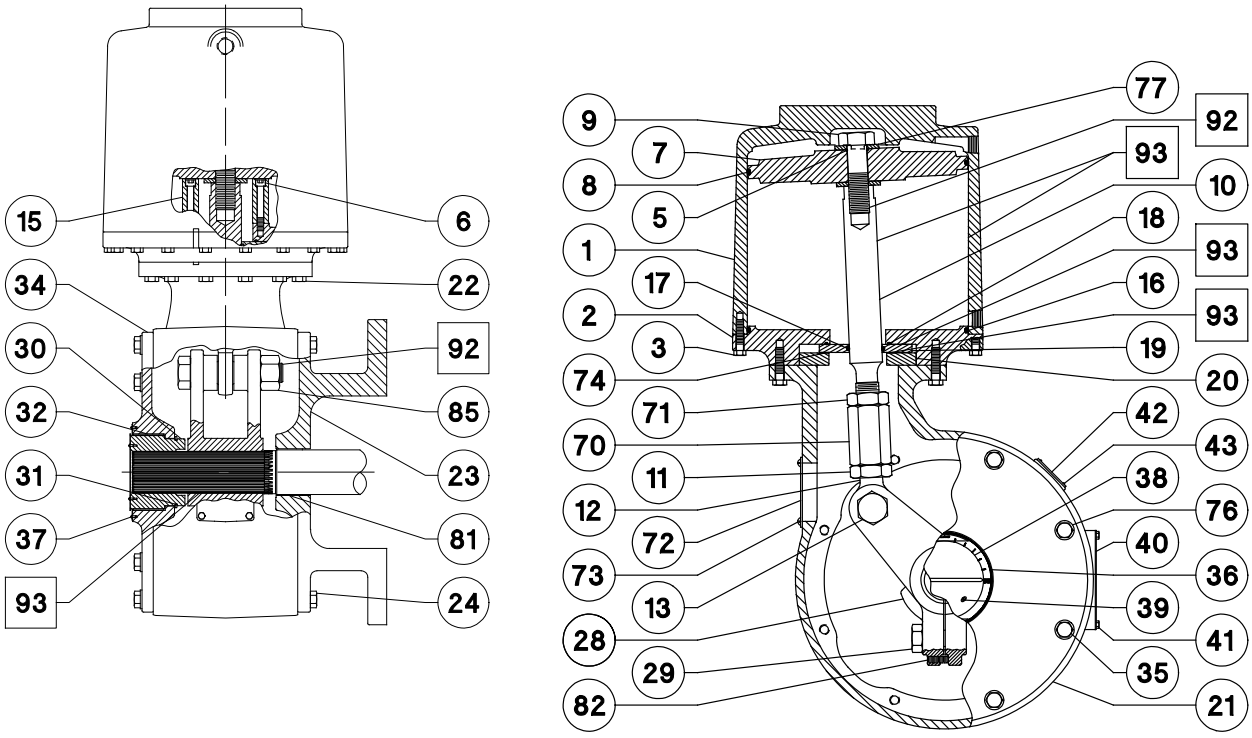


Figure 11. Typical Assembly for Fisher 1061 Size 130 Actuators



NOTES:
KEY 55 IS NOT SHOWN.
□ APPLY LUBRICANT OR SEALANT.
58B3057-B SHT 1 AND SHT2

Keys 23 and 81*, Mounting Yoke Parts

VALVE DESIGN	ACTUATOR SIZE	VALVE SHAFT DIAMETER		KEY 23 YOKE-BUSHING ASSEMBLY, CAST IRON AND PTFE(1)	KEY 23 YOKE, CAST IRON	KEY 81 BUSHING, PTFE
		Inches	mm			
8510B, 8532, 8560, CV500, V150, V200, V250, V300, V500, F Mounting Adaptation	30	1/2	12.7	12A9799X0A2	- - -	1U902599402
		5/8	15.9	12A9799X0B2	- - -	12A9555X012
		9/16 x 5/8	14.3 x 15.9	12A9799X222	- - -	12B5852X012
		3/4	19.1	12A9799X0C2	- - -	12A9556X012
		7/8	22.2	12A9799X0E2	- - -	12A9557X012
		1	25.4	12A9799X0G2	- - -	12A9775x012
		1-1/8 x 1-1/4	28.6 x 31.8	12A9799X232	- - -	12B5853X012
		1-1/4	31.8	12A9799X112	- - -	12A9558X012
	40, 60, & 68	3/4	19.1	12A9799X0D2	- - -	12A9556X012
		7/8	22.2	12A9799X0F2	- - -	12A9557X012
		1	24.4	12A9799X0H2	- - -	12A9775X012
		1-1/8 x 1-1/4	28.6 x31.8	12A9799X242	- - -	12A5853X012
		1-1/4	31.8	12A9799X0J2	- - -	12A9558X012
		1-1/2	38.8	12A9799X0K2	- - -	12A9559X012
		1-9/16 x 1-3/4	39.7 x 44.5	12A9799X282	- - -	12B6104X012
		1-3/4	44.5	12A9799X0L2	- - -	10A3848X012
		2	50.8	12A9799X0M2	- - -	12A9715X012
	80 & 100(2) (with DU Bushing Design Split Bearing)	1-9/16 x 1-3/4	39.7 x 44.5	12A9799X292	- - -	12B6104X012
		1-3/4	44.5	12A9799X0N2	- - -	12A9560X012
		2	50.8	12A9799X0P2	- - -	12A9561X012
		2-1/8	54	12A9799X212	- - -	12B3363X012
		2-1/4 x 2-1/2	57.2 x 63.5	12A9799X272	- - -	12B6750X012
		2-1/2	63.5	12A9799X0R2	- - -	12A9598X012
		3 x 2-1/2	76.2 x 63.5	12A9799X0S2	- - -	12A9598X012
		3-1/2 x 2-1/2	88.9 x 63.5			
		4 x 2-1/2	101.6 x 63.5			
	130(2) (with DU Bushing Design Split Bearing)	3	76.2	12A9799X332	48B3060X012	18A8022X012
		3-1/2	88.9	12A9799X342	48B3022X012	18A8014X012
	80 & 100(2) (with Solid Bearing)	1-9/16 x 1-3/4	39.7 x 44.5	12A9799X352	- - -	GE09072X012
		1-3/4	44.5	12A9799X362	- - -	GE09073X012
		2	50.8	12A9799X372	- - -	GE09074X012
		2-1/8	54	12A9799X212	- - -	12B3363X012
		2-1/4 x 2-1/2	57.2 x 63.5	12A9799X272	- - -	12B6750X012
		2-1/2	63.5	12A9799X382	- - -	GE09075X012
		2-3/4 x 2-1/2	69.9 x 63.5			
		3 x 2-1/2 (V250)	76.2 x 63.5			
		3 x 2-1/2	76.2 x 63.5	12A9799X0S2	- - -	12A9598X012
		3-1/2 x 2-1/2	88.9 x 63.5			
		4 x 2-1/2	101.6 x 63.5			
	130(2) (with Solid Bearing)	3	76.2	12A9799X402	48B3022X012	GE09077X012
		3-1/2	88.9	12A9799X342	48B3022X012	18A8014X012
9500 G Mounting Adaptation	30	1/2	12.7	- - -	32A9755X012	1U902599402
		5/8	15.9	- - -	32A9742X012	12A9555X012
		3/4	19.1	- - -	32A9743X012	12A9556X012
		1	25.4	- - -	32A9757X012	12A9775X012
		1-1/4	31.8	- - -	32A9746X012	12A9558X012
	40, 60, & 68	3/4	19.1	- - -	32A9750X012	12A9556X012
		1	25.4	- - -	32A9778X012	12A9775X012
		1-1/4	31.8	- - -	32A9753X012	12A9558X012
		1-1/2	38.1	- - -	32A9754X012	12A9559X012
		1-3/4	44.5	- - -	35A9704X012	12A9560X012
			50.8	- - -	35A9705X012	12A9561X012
	80 & 100	1-3/4	44.5	- - -	35A9707X012	12A9560X012
		2	50.8	- - -	35A9708X012	12A9561X012
		2-1/2	63.5	- - -	35A9706X012	12A9598X012

1. These yokes are available only as yoke-bushing assemblies. However, bushings are available as individual replacement parts.
2. Design was changed from thin (3/32 inch) wall DU Split Bearing to a thicker (5/16 inch) wall Solid Bearing in 2004. When ordering replacement parts, state the valve serial number.

*Recommended spare parts

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